WHAT SHOULD WE DO WITH OUR CARS WHILE WE TAKE THE TRAIN?

By
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ABSTRACT

Susan A. Faulkner: What Should We Do With Our Cars While We Take the Train?
(Under the direction of Prof. Daniel Rodriguez)

Twenty-nine U.S. cities are considering building commuter rail systems to help alleviate road congestion. At the preliminary design stage of these systems, planners make decisions concerning parking at many of the stations. Planners must balance the need to encourage ridership with the problem that land acquisition is very costly and land used for parking may not be the best use of land.

In this Master Project, I examined how commuter rail agencies in the U.S. and Canada are currently meeting and managing the parking demand at their stations. Using a survey instrument, I sampled twenty agencies to discover what parking problems they have encountered, their solutions and recommendations, and drew comparisons to best practices.

Strategies recommended and used by current rail providers include kiss 'n rides, multi-modal station designs, shared parking, car sharing programs, designated spaces for vanpools and carpools, and parking benefit districts. To improve the effectiveness of these strategies, I recommend combining several different parking demand management strategies.

To my parents, Joan and Lawrence Richard
and my children, Jennifer and Michael
who have given me their constant love and support
through my many years of seeking an education

To my very wise friend and consul, Dr. MM Shaw

To the ever-patient faculty at DCRP

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LIST OF ABBREVIATIONS

APTA	American Public Transportation Association
CBD	Central Business District
FTA	Federal Transit Association
ITE	Institute of Transportation Engineers
NTD	National Transit Database
PAS	Planning Advisory Service
RPP	Residential Parking Permit
SOV	Single Occupancy Vehicle
TDM	Transportation Demand Management
TEA21	Transportation Equity Act for the 21st Century
TRB	Transportation Research Board
UCLA	University of California – Los Angeles
ULI	Urban Land Institute

1. Introduction:

Wherever there are people, there are vehicles. Over 200 million vehicles currently travel our U.S. roadways. The vehicles are registered for the personal use of the more than 281 million people living in the United States in 2000 according to the U.S. Census Bureau. When the 31 million children under the age of 16 are subtracted from this population, this means there are approximately eight cars for every ten people (U.S. Census Bureau, American Fact Finder). The vehicles per capita ratio has continued to escalate over the years, with no indication of a decrease or a leveling off in the future. Our U.S. economy, land use choices, and way of life are largely built around our transportability by private vehicle. Figure 1 portrays the way congestion looks in many our U.S. cities today.

Figure 1. Congestion near New York City
Source: http://www.mta.nyc.ny.us/bandt/traffic/advmain.htm

With the ever-increasing numbers of vehicles pouring onto our roadways, many U.S. municipalities and the leadership in Washington are choosing to consider alternatives to the constant building and widening of roads. Improving or building attractive and accessible public transportation systems is one of the alternatives being considered. According to the American Public Transportation Association (APTA), 29 urban areas are currently in the process of evaluating and designing commuter rail systems[1], which is just one of the possible mode choices for a public transportation system. Twenty-nine new commuter rail agencies would more than double the number of existing agencies providing commuter rail, if all of these systems were to be built. Many of the 29 cities are located within the interior states as opposed to the U.S. coastlines (Figure 2). The cities vary greatly in size of their population. Five of the cities have populations under 100,000 and two of the cities have populations that exceed 1,000,000.

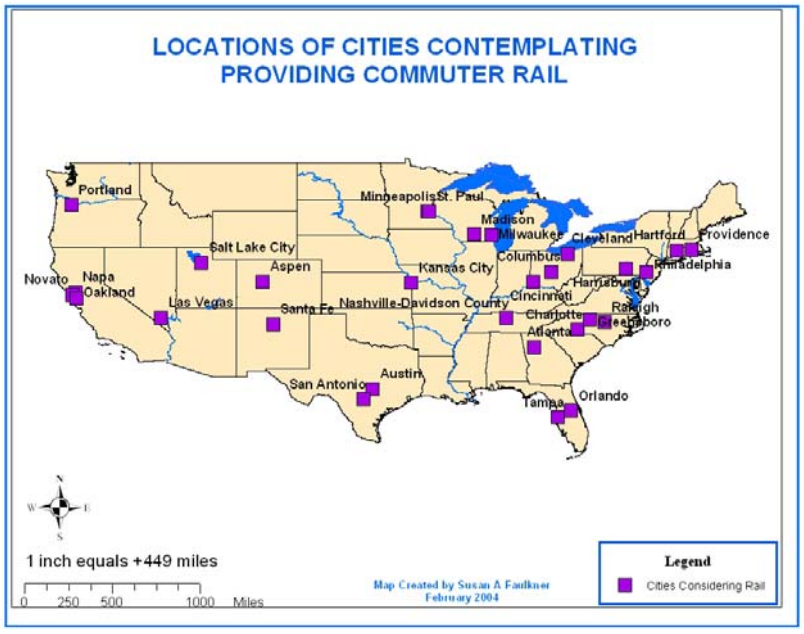

Figure 2. Locations of Cities Contemplating Providing Commuter Rail

Many of the transit agencies for these 29 urban areas have applied to the Federal Transit Association (FTA) to be a part of the New Starts Project, a project supported by the TEA21 Act, an Act passed by Federal legislation to support public transportation.

Through the Transportation Equity Act for the 21st century (TEA21), the New Starts Project includes funding assistance for the application and building of both new systems and extensions of current public transportation systems (Guideway Capital Investments). The qualifying systems (including commuter rail systems) are those using fixed quideways (such as rail lines) or separate rights of ways for the use of public transportation. The FTA evaluates and rates eligible New Starts Projects applications. Not all of the proposed commuter rail projects will move forward towards the actual building of a system; some will not be built in accordance with the FTA rating of "not recommended."

As the recommended New Starts commuter rail projects move forward, they have the unique opportunity to address many of the problems faced by older, previously established systems. They have the advantage of working towards solving these identified problems through planning and design, prior to the actual building of their systems. Among the many challenging issues facing the New Starts commuter rail agencies, this paper will focus on just one issue of concern, parking. The planning, designing, constructing, and managing of parking require a wide range of skills and knowledge.

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[1] See List of Definitions

2. The Study

Study Question: What Should We Do With Our Cars While We Take the Train?

Many U.S. cities are considering building commuter rail systems to help alleviate their area road congestion. Land purchased and used for parking at the proposed rail stations is one component of the station design plans. One of the problems facing the agencies is that land acquisition is very costly and land used for parking may not be the best use of this land.

This paper is a case study examining what commuter rail agencies in the U.S. and Canada are currently doing to meet and manage their parking demand, what parking problems they have encountered, their solutions and recommendations, and an examination of what the current literature says are best practices and trends for parking strategies. Data for this study was gathered by surveying commuter rail agencies through e-mails, faxes, phone interviews, and web searches.

The first step in this study was to identify all current commuter rail agencies in the U.S. and Canada. The Federal Transit Administration compiles a profile for each U.S. transit agency that submits a report (a report that is required when federal monies are used in the operation of their transportation system) in the National Transit Database (NTD). In 2001 (the most recent information available), the NTD reported in the National Transit Summaries and Trends that there were 21 agencies providing commuter rail out of the 448 transit agencies reporting. When examining each individual profile from the NTD, it was found to actually only contain 17 commuter rail agencies; and one of them, DART/TRE, was listed twice. There were several State Departments of

Transportation that were listed in the NTD, because they had purchased commuter rail cars, but they did not actually operate a commuter rail system.

Working with the NTD list of 16 U.S. commuter rail agencies, the American Public Transportation Association (APTA) Website was then scanned for more recent commuter rail agency information. In the report titled, "Commuter Rail Transit Agencies Ridership Data for 2002", APTA also listed 21 agencies (slightly different agencies from the NTD list) including two (Burlington VT and Syracuse, NY) with no commuter rail passenger miles available. On closer examination it was discovered that Syracuse On Track is currently up and running and was added to the list of 16 agencies. APTA had also listed the Pennsylvania Dept. of Transportation, which was not included in the agencies to be surveyed. Peninsula Corridor Joint Powers Board was listed by APTA as a commuter rail provider. This was added to the list of agencies to survey under its agency name of CalTrain. This brought the total of U.S. commuter rail agencies to 18.

The APTA list also included Alaska Railroad, which this study later decided should not be included in commuter rail agencies at this time. Alaska Railroad does not fit the true definition of commuter rail because of the schedule and distance that is traveled by the rail. Alaska Railroad is used to travel throughout Alaska, but its pricing and schedule currently make it prohibitive for commuting to and from a job on a daily basis. They are currently considering building a more traditional commuter rail line.

A total of 18 U.S. commuter rail agencies were included in this study. The study also aimed to include information from Canadian commuter rail providers. To discover the names of Canadian commuter rail agencies, the APTA current ridership data for Canada was examined. Three cities (Montreal, Toronto, and Vancouver) were listed as

providing commuter rail. The AMT (Agence Metropolitaine de Transport) of Montreal was not included in the study, because of the language barrier. All information on the Website (including contact information) about the AMT was in French, so a decision was made to not try to contact this agency or include this agency in the study.

Once the list of twenty commuter rail agencies was established, every attempt was made to contact a person at each agency who would be knowledgeable concerning parking at the rail stations. Letters explaining the study were sent out through e-mails (usually following initial phone conversations) with the written survey attached. The written survey (a blank copy of the survey can be seen in Appendix A) was completed by 16 agencies currently providing commuter rail transportation in the U.S. and Canada. The remaining four agencies were included in the survey tabulation through the use of information from their websites and contact with their customer service departments. The decision was made to include these four agencies to increase the number of observations in the study and due to the general availability of information. The four agencies not completing the survey but included in the tabulations are: New Jersey Transit, Syracuse OnTrack, Shore Line East, and Northern Indiana Commuter Transportation District. Table I (shown on Page 16) identifies the 20 agencies included in the study.

TABLE I

AGENCIES PARTICIPATING IN SURVEY

NAME	ACRONYM	LOCATION
Altamont Commuter Express	ACE	Stockton, CA
CalTrain	CalTain	San Carlos, CA
Dallas Area Rapid Transit/ Trinity Railway Express	DART - TRE	Dallas, TX/ Irving, TX
GoTransit	Go	Toronto, Ontario
Massachusetts Bay Transportation Authority	MBTA	Boston, MA
Northeast Illinois Regional Commuter Railroad Corp	Metra	Chicago, Il
Southern California Regional Rail Authority	MetroLinks	Los Angeles, CA
MTA –Metro North Rail	MTA - MNR	New York City, NY
MTA – Long Island Railroad	MTA – LIRR	Jamaica, NY
Maryland Transit Authority	MTA - MARC	Baltimore, MD
North County Transit District	NCTD – known as Coaster	San Diego, CA
Northern Indiana Commuter Transportation District	NICTD	Chesterton, IN
New Jersey Transit	NJT	Newark, NJ
Syracuse On Track	On Track	Syracuse, NY
Southeastern Pennsylvania Transportation Authority	SEPTA	Philadelphia, PA
South Florida Transportation Authority	SFRTA/ Tri Rail	Miami, FL
Shore Line East	SLE	New Haven, CT
Sound Transit	SoundTransit	Seattle, WA
Virginia Railway Express	VRE	Alexandria, VA
West Coast Express	WCE	Vancouver, BC

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The participating urban areas encompassed almost every size city, ranging in population size from very large to fairly small. The locations of the 20 cities included in this study are shown on the map in Figure 3.

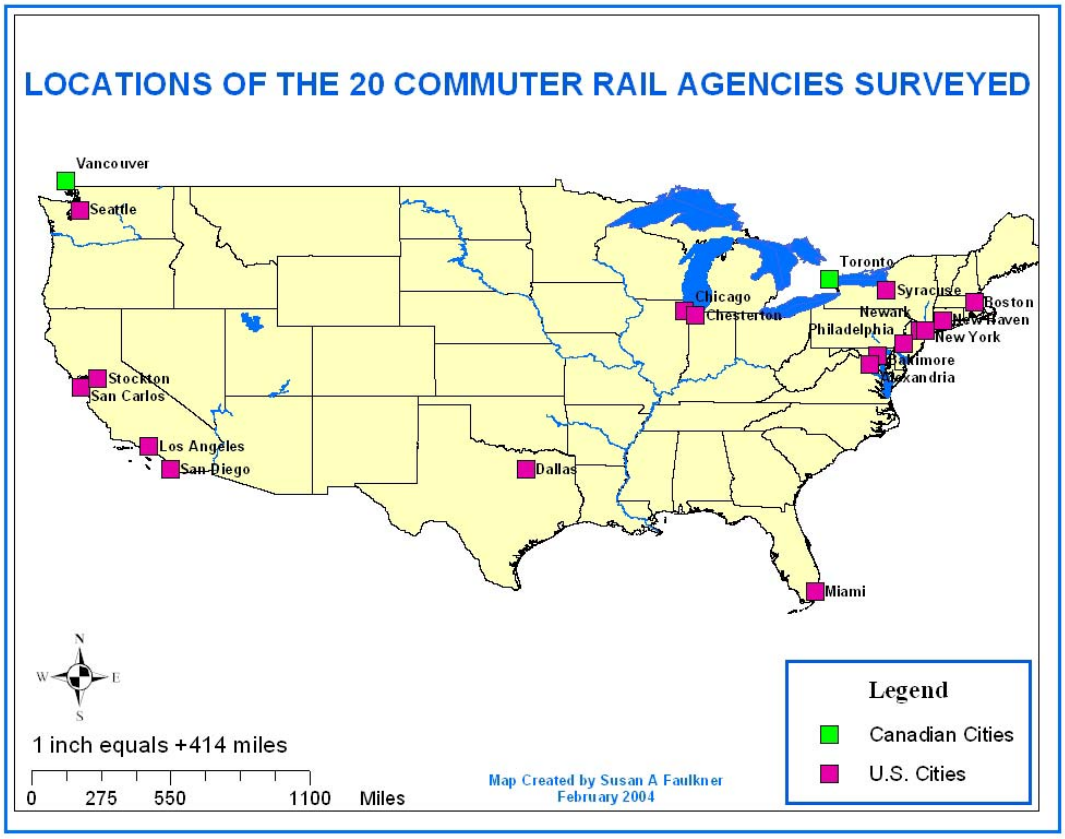

Figure 3. Map – Locations of the 20 Commuter Rail Agencies Surveyed

As this study progressed, it became obvious that the survey questions were broad and the respondents were trying to over-generalize the current situation giving just one answer for all stations. An individual commuter rail agency would have some of its stations located in urban areas, while others would be in a suburban setting. The way in which parking is handled (along with everything else) differs according to location and local zoning ordinances.

The respondents to this survey gave a valiant effort to generalize their answers into useable data. They frequently qualified almost every answer with exceptions to their answers. An example of the generalizing of data is: when asked, "Do you have bike lockers? Yes or no?" They would answer yes, if even just one station had one bike locker. Figure 4 shows how bike lockers can be clustered together in a parking area to take up the least amount of space. To get a more accurate portrayal of the abundance or shortage of bike lockers at the commuter rail stations, data would need to be collected that not only asked if they had lockers, but how many at each station. Some agencies have almost 200 stations. A decision was made at this point in the study not to collect data fine-tuned to the station level, due to the enormous amount of time that would have been necessary; especially the amount of time respondents would have needed to complete the survey. The survey answers give a quick sketch of the stations. The number of respondents was of such a manageable size, that any agency was able to be easily re-contacted in the event of desiring additional information.

Figure 4. Bike Lockers
Source: http://www.bikemap.com/transit/photos_files/prince.jpg

The questionnaires were summarized and the respondents' answers were incorporated throughout the paper. This study uses the collected data more as a quick sketch of the current commuter rail agencies, than a detailed photograph of each. This paper is intended to be an up-to-date source for the New Starts commuter rail agencies as

they face decisions about how much parking should be provided at their stations and by whom, who and how it should be managed, and whether there should be charges associated with the parking. It also addresses concerns over the possible amenities provided at the stations such as bicycle parking, security, and the use of a multi-modal station design.

Individual stories from the respondents of problems they encountered and solved, any recommendations they offer to New Starts agencies, and any particularly interesting and creative solutions have also been incorporated into the study. Figure 5 shows an innovative solution for encouraging an alternative mode of travel and using less land at the parking area at the same time – that of using the more portable bike lid instead of the more space consuming bike lockers. A bike lid still offers a protective cover over a bike, while taking up less space.

Figure 5. Bike Lid

Source: www.bikemap.com/transit/ photos.htm

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3. Background: Why is Parking a Problem? How Much Parking is Enough?

3.1 Land Use.

Parking is a very real and sometimes overlooked land use. Have you ever driven somewhere and been unable to find a place to put your car when you reached your destination? Each of the more than 200 million vehicles in the U.S. use at least three different locations each week to park during the approximately 23 hours a day in which they are not moving about on roadways (Transportation Alternatives, 1999). Mark Childs in Parking Spaces stated, "ninety percent of cars are not busy transporting us at any given time, but actually sitting parked." He went on to say that "there are approximately seven parking stalls for every car in an American city" (Childs, 1999, p. 51).

Parking areas use an extraordinary number of acres of land that generally serve no other purpose than to be a place to put our cars when we are not using them. An accurate count of the total acreage used for parking in the U.S. does not exist, but if it did – it would be a very eye-opening figure indeed. Childs remarked in Parking Spaces that there are "secondary costs of excessive parking such as erosion of the quality of the pedestrian system, demand on the road network, water and air pollution, and ugly cities." (Childs, 1999, p. 203-204)

3.2 Environmental Impacts.

Parking lots not only use a tremendous number of acres, but also create a negative

impact on the environment. Asphalt parking lots are impervious surfaces that prevent rainwater from draining naturally into our aquifers and create hazardous runoff. The oils, gasoline, and other chemicals that escape and drip from our vehicles onto the asphalt mix with rain and snow. The mix of drippings and water are then channeled into concentrated retention areas at the edges of the parking lots (Figure 6 shows such a collection area), where the polluted water seeps into our groundwater supply, or it is channeled down into storm water drains. The storm water must then be treated at a water treatment plant (which is an economic impact). This polluted runoff causes the water quality in our water system and in our groundwater to be less than desirable.

Figure 6. Water Pollution next to Parking Lot
Source: http://www.fcwc.org/WEArchive/010203/parking_lot.jpg

There are other negative externalities associated with parking as well. There is a social and economic cost in air pollution, that is the result of our use of automobiles (Deuker, 1998). There is also a social cost of using land for the sole purpose of storing our vehicles while they are not in use. This choice prevents more satisfactory and desirable uses of the land. Parking lots also create aesthetic impacts with their large "seas of cars" scarring the land.

3.3 Economic Impact.

Parking, in addition to being a large consumer of land and a creator of less than desirable impacts on the environment, also creates economic impacts. As mentioned in

the previous section, there are direct costs for the treatment of water and air pollution and other environmental impacts.

There is no such thing as "free" parking. Costs for providing parking can range greatly, but are always very expensive for the constructor and maintainer of the parking. Parking structures have higher construction costs (with ballpark estimates of approximately $10,000 per space – but that may actually be quite a bit higher) than construction costs of surface lots, but structures do have the benefit of producing smaller impacts on the land and environment. Recently the Raleigh/Durham Airport built a new parking deck at the cost of approximately $16,130 per space (Baysden, 2003).

Not only are there construction costs to consider, but maintenance costs as well. Rutgers University increased the cost of its parking permits by 20% in 2003, citing routine maintenance and repairs as the reason for the increase (Spear, 2003). Based on the environmental impacts and construction costs of building large parking lots and structures, it is to the benefit of all, for commuter rail agencies to explore any and all alternative ways in which to transport patrons to their stations.

Donald Shoup, a professor of economics at UCLA has done extensive work on parking costs and minimum parking requirements. He believes the cost of parking is not a variable that is considered when estimating parking generation rates, but should be.

> "Urban planners typically set the minimum parking requirements for every land use to satisfy the peak demand for free parking. As a result, parking is free for 99 percent of automobile trips in the United States. Minimum parking requirements increase the supply and reduce the price–but not the cost–of parking. They bundle the cost of parking spaces into the cost of development, and thereby increase the prices of all the goods and services sold at the sites that offer free parking. Cars have many external costs, but the external cost of parking in cities may be greater than all the other external costs combined. To prevent spillover, cities could price on-street parking rather than require off-street parking. Compared with minimum

> parking requirements, market prices can allocate parking spaces fairly and efficiently" (Shoup, Dec.1999, 549).

Shoup feels minimum parking requirements make two unreasonable assumptions: (1) the demand for parking does not depend on its price and (2) the supply of parking should not be dependent on the cost to provide parking (Shoup, Dec.1999). Shoup feels planners should start taking real notice of minimum parking requirements. Shoup calls parking the "unstudied link between transportation and land use". "Urban planners have made serious mistakes in dealing with parking…" (Shoup, 1997, 3). Figure 7 shows the results of planners building minimum parking requirements at a shopping mall, as it is currently calculated to peak demand at Christmastime.

> "…The leading textbooks on urban transportation planning also do not mention parking requirements. This silence suggests that planning academics have not seriously considered–or even noticed–the topic." (Shoup, Dec.1999, 550)

Figure 7. Almost Empty Parking Lot Built to Minimum Parking Requirements During Highest Peak Period
Source: http://aria.arizona.edu/courses/arl641/1999/ch_4files/parking.jpg

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4. The Parking Dilemma

Parking is a dilemma for land use planners and the commuter rail agencies. It presents planners with two choices that are both less than desirable. One choice is to provide parking based on minimum parking standards (built to meet the demand at peak times such as the Christmas shopping season) that leave much of the parking unused a great portion of the rest of the year. The second choice is to purposefully build a supply of parking that is considerably less than adequate according to minimum parking requirements in the hope that it will encourage people to choose an alternative travel mode to their destination. This decision might, in actuality, force individuals to travel to a completely different destination that provides ample free parking, creating economic hardships on the poorly supplied parking areas.

4.1 Minimum Parking Requirements.

Donald Shoup has done extensive writing as an advocate of no minimum parking standards. Shoup states, "Minimum parking requirements act like a fertility drug for cars" (Shoup, 1997, 12). In "The Trouble With Minimum Parking Requirements" Shoup pointed out weaknesses of the minimum parking standards (see his quote on pages 22-23). Planners usually calculate minimum parking standards in one of two ways, either by surveying nearby towns or by using regression equations in Parking Generation by ITE, Institution of Transportation Engineers, as their guideline. The Planning Advisory Service (PAS) has published three editions of national surveys of parking requirements for local communities. Both the ITE publication and the PAS survey are widely used by planners.

> "Richard Willson (1996) surveyed planning directors in 144 cities to learn how they set parking requirements. The two most frequently cited methods were "survey nearby cities" and "consult Institute of Transportation Engineers (ITE) handbooks." Both strategies cause serious problems" (Shoup, 1999, 550).

Shoup feels that the parking generation numbers do not accurately portray the true costs of parking.

> "*Parking Generation* is a questionable resource for several reasons. First, parking generation rates are inflated by the ample free parking. Second, no information is provided on several key issues. Why and where were the surveys conducted? How long did the surveys last? How long did the peak parking occupancy last? Finally, nothing is said about off-peak parking occupancy. *Parking Generation* raises more questions than it answers." (Shoup, Dec.1999, 551)

Just as an aside, there is no listing for a commuter rail station in Parking Generation 2nd Edition; the only type of parking listed for a center of transportation is a listing for a commercial airport. The regression is accompanied with parking characteristics and a data limitations warning to "use caution with the data due to small sample size." There is work being done to update this 2nd Edition, including 11 studies submitted for light rail stations – but this is still a small sample size and weak regression, according to McCourt in "Updating the Parking Generation Informational Report" (McCourt, 2001).

4.2 ITE Accuracy.

Shoup also points out additional specific weaknesses in the implied accuracy of the ITE method. The parking generation regressions use numbers carried out to the third decimal place, and with this degree of precision it implies great accuracy (Shoup, 2002). However, Shoup states that this precision is unfounded, when it is remembered that the

data collected is often from a suburban area where no other transportation choices are available besides automobiles and the parking is free.

> "The trip generation rate looks accurate because it is so precise, but the precision is misleading. Few transportation or land-use decisions would be changed if ITE reported the trip generation rate as 632 rather than 632.125 trips per 1,000 square feet, so the three-decimal-point precision serves no purpose." (Shoup, 2002, 21)

In order to assist the planner or commuter rail agency in making the difficult decisions of how much parking to provide and whether a fee should be associated with parking, a great deal of community participation should occur with both public and private stakeholders throughout the entire decision process. Generally, people know that a sea of parked cars is not only harmful to the environment, but also unsightly. On the other hand, when the public or civic leaders refer to a "parking problem," they are usually referring to a parking supply that is perceived inadequate, or the difficulty in locating an open parking space exactly where they want to park (within just a few feet of their destination).

4.3 Free Parking.

As commuter rail agencies work to attract patronage to their new service, there will be a tendency to provide ample free parking at the stations whenever possible. In The Urban Transport Crisis, John Pucher and Christian Lefèvre stated, "According to the Nationwide Personal Transportation Survey, drivers in the U.S.A. benefited from free parking for 99 per cent of all trips they made in 1990, and for 95 per cent of all work trips (Federal Highway Administration, 1992c)" (Pucher and Lefèvre, 1996, 29).

Although drivers do not hand over money in exchange for parking their vehicles, there are very real parking costs and they are bundled and passed onto all (drivers and non-drivers alike). The cost of parking hides in the general markup of merchandise, or in the cost of housing, or in the number of employees who are never hired, or in the bonuses that are never offered. Drivers and others stay ignorant of the actual cost of parking because of this shell game. Complaints about the high cost of parking only begin when the costs of parking become known and visible for all to see.

Public transit agencies want to do everything they can to attract ridership, and offering "free" parking whenever possible is the perceived norm. Many studies have pointed out that even a minimal charge for parking at the station is received very negatively by the public as a direct cost of riding transit that drivers would not otherwise incur.

To consider building less parking while enacting parking strategies from the very beginning stages of station design will feel contradictory to this tendency, but might be the best possible choice in the long run. Donald Shoup feels the decisions about parking influence travel behavior, mode choice, land use, and development patterns on a local and regional level. (Shoup, Dec. 1999). Shoup feels change can be realized by charging market prices for parking.

> "…First, motorists will economize on parking by changing their travel behavior. Shifting to higher occupancy vehicles to spread the cost of parking among more people will reduce the demand for parking. Shifting to walking, cycling, or public transit will also reduce the demand for parking. Shifting vehicle trips to off-peak will reduce the demand for parking at peak hours. Finally, citizens can choose to own fewer cars, and this will reduce the demand for parking." (Shoup, 1999, 568)

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5. Eight Parking Strategies

In 1998, Kenneth Deuker and his colleagues worked on an analysis for the Transit Research Board titled, "Strategies to Attract Auto Users to Public Transportation." They surveyed twenty U.S. cities and examined their parking characteristics. Through their research they compiled a list of eight parking strategies to encourage people to get out of their cars and onto public transportation. Parking strategies are policies or programs that affect supply, demand or costs. Although commuter rail agencies cannot enact all of these strategies by themselves, they can encourage the municipalities in which the stations are located to consider using a combination of several of these strategies in their zoning ordinances.

Deuker et al. examined each of the eight strategies from a variety of criteria: effectiveness, scope, political feasibility, economic efficiency, and the ability to implement. Table II on Page 29 shows a breakdown of how each of the eight strategies scored on each of the criterion. They recommended that using a combination of these strategies is the way to be most effective. However, some of the pricing strategies might not be as beneficial to increasing ridership, if they were applied to the commuter rail station parking. On the other hand, Deuker found that cities that implemented restrictive parking strategies also tended to have higher levels of transit service and ridership. They found that parking price "has a positive effect on transit ridership" (but they were not referring to the pricing at the station itself) (Deuker, 1998, 93).

The eight parking strategies and some of the specific results of the study are briefly described following Table II (Table II is taken directly from Deuker's "Strategies to Attract Auto Users to Public Transportation" 1998):

TABLE II

Assessment of Individual Parking Strategies

From Deuker et al. "Strategies to Attract Auto Users to Public Transportation." TRB Report 40. Washington: National Academy Press, 1998, p.7.

Strategy	Effectiveness	Scope	Political Feasibility	Efficiency	Ease of Administration
Increasing the price of parking, based on a tax on revenues	Moderate	Temporal: Broad Functional: Moderate to Narrow Spatial: Moderate to Narrow	Moderate	Low to Moderate	Moderate to High
Increasing the price of parking, based on a tax on parking spaces	High in CBD with good transit; Lowest in suburban business districts or where transit service is low	Temporal: Broad Functional: Broad Spatial: Broad	Low	Low	Low
Cashing-out employer provided parking	Moderate	Temporal: Narrow Functional: Narrow Spatial: Narrow	Moderate	Moderate	Moderate
Expanding meters & accompanying residential permit programs	Low to Moderate	Temporal: Broad Functional: Moderate to Narrow Spatial: Narrow	Moderate	Moderate to High	Low to Moderate
Parking Impact Fees	Very Low short term a little better long term	Temporal: Broad Functional: Broad Spatial: Narrow	Moderate to High	Low to Moderate	Moderate
Changes in Zoning Ordinances to restrict parking supply: • Decreased Minimums • Parking Maximums • Conditional-use permits	Very Low short term a little better long term	Temporal: Broad Functional: Broad Spatial: Narrow	Moderate to High	Low to Moderate	Moderate
Shared Parking	Low	Temporal: Broad Functional: Broad Spatial: Narrow	Moderate to High	Moderate	Low to Moderate
TDM: • Satellite parking-shuttle lots • Preferential parking for carpoolers • Transit-incentive programs	Low to Moderate	Temporal: Narrow Functional: Narrow Spatial: Narrow	High	Moderate to high unless high subsidies are required	

5. Eight Parking Strategies, Continued

5.1 Increasing the price of parking based on a tax on parking revenues.

This tax would best be applied only to fee-based parking, and only when located in a CBD. Deuker et al. stated, "The modeling revealed that a 20-percent tax on parking revenues would result in a 7-percent increase in transit ridership for home-based trips regionwide (in the Portland metropolitan area)." (Deuker, 1998, 6)

5.2 Increasing the price of parking based on a tax on parking spaces.

This tax could equitably be applied throughout an entire region to parking that has been previously priced, as well as parking that has not been previously priced. With as little as a $1 surcharge, this tax could create as much as a 22 percent increase in transit ridership in home-based work trips (Deuker, 1998, 8).

5.3 Cashing-out employer-provided parking.

Since 1993, California has required employers, with more than 50 employees and who subsidize the cost of parking by providing free parking to employees (only where the employers have to lease parking), to offer employees the option of receiving the cash equivalent to the subsidy of the space instead of using their parking space (Childs, 1999).

Donald Shoup said, "Employer-paid parking is an invitation to drive to work alone" (Shoup, 1995, 14). When employers subsidize the cost of parking, that is covering about one third of all vehicle miles traveled (Shoup, 1995). The money employers spend on parking subsidies is money that cannot be used to increase wages or add other employee benefits. The demand for free employee parking goes down

significantly when employees are offered cash in lieu of a parking space (even when it is listed as taxable income). Non-solo drivers do not reap any benefits from this program unless it is specifically addressed. Spillover parking in the vicinity of the employer must also be mitigated in order to truly reduce employee driving and prevent employees from just parking on nearby streets, while still collecting the cash-out money. Deuker et al. felt that cashing-out employer provided parking made an excellent TDM measure when precautions for spillover parking and equity issues were properly addressed (Deuker, 1998, 12).

5.4 Expanding meters and accompanying residential permit programs.

Meters are often used to control spillover parking (parking that spills on to surface streets from parking lots and garages). Placing more meters on surface streets or requiring a permit in designated residential districts helps control this spillover. Figure 8 shows the way in which most on-street meters look.

The revenues from this strategy can be funneled back into the same designated residential districts that the program is targeting. In a Residential Parking Permit (RPP) district, permits are usually given free to residents to differentiate their cars from non-residents using on-street parking. Non-residents would be required to pay market price for parking within this district.

Figure 8. On-Street Parking with Meters
Source:http://www.info.gov.hk/td/eng/transport/images/parking.gif

Shoup took the RPP and created the idea that the monies collected for parking and fines should be returned to the neighborhood to help make local improvements to streets and sidewalks and support local community programs, instead of going into the general funds of the city. Shoup called this strategy "Parking Benefit Districts" to distinguish it from the original Residential Parking Permit districts. (Shoup, 1994, 21). Shoup is a strong advocate of taking much of the free parking and making it fee-based in the future.

Old Pasadena used Shoup's idea of a Parking Benefit District. In Old Pasadena meter money was taken and reinvested into the local community for street improvements to make it more walkable and aesthetically pleasing. Since 1990 this community went through such a transformation as to increase its sales tax revenues sevenfold, benefiting from the improved walkability of the area. It has gone from a skid row area to becoming a commercially viable area (Streeter, 2004).

5.4.a. Hide and Ride Parking

Although Deuker et al. did not address this topic by this name, they did discuss this issue. Sometimes people will go to great lengths to avoid paying for parking. In Seattle, a specific parking phenomena is being observed and mitigated that is closely related to spillover parking and curb parking. There are people who park on Seattle's local streets (where there are no parking meters or RPPs) near their rail stations instead of parking at the rail station parking facilities. The thing that distinguishes this behavior from simple spillover parking is that these parkers will park on nearby streets and in private lots just to avoid paying parking fees at the rail station. Their behavior is not contingent on the parking facility being full.

Mary Catherine Snyder who is with the City of Seattle Department of Transportation (DOT) calls this behavior "Hide and Ride Parking". The term "hide and ride" adds an intriguing spin to the old terminology of "spillover parking". It correctly assigns responsibility for this action to the parkers instead of blaming the rail agency that is providing parking. It might be helpful for commuter rail agencies to use the term "hide and ride" in their future public meetings.

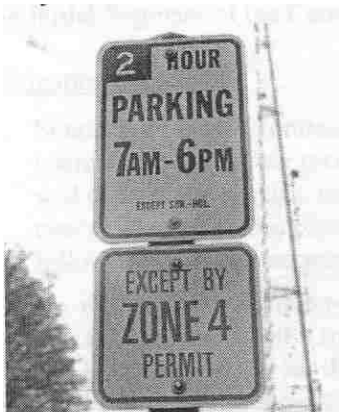

Figure 9. Parking Restriction Signage
Source: "Hide and Ride Parking Mitigation" by SDOT

The Seattle DOT is currently mitigating this situation by installing 1-2 hour time limit signage on curb parking with exception signage for cars displaying a permit in their newly created Residential Parking Zones. Figure 9 shows the signs the SDOT installed in the areas of concern. The City is also installing paid parking technology with new pay stations. Sound Transit is going to conduct an on-street parking inventory around each station to identify where "Hide and Ride Parking" might be likely to occur without any interventions. Sound Transit is going to implement a public education and marketing campaign related to hide and ride parking and access to the rail stations (SDOT, 2003).

5.5 Parking impact fees.

These fees are a subset of road impact fees. A one-time fee is levied against the developers based on the amount of parking they are providing. The fee is "meant to cover the costs the parking creates for the transportation system as a whole…" (Deuker,

1998, 72). Lowering or eliminating required minimum parking standards could effectively reduce the impact and therefore reduce impact fees as well.

Sometimes impact fees are levied against a developer to cover the cost that the city incurs to build the full-required minimum parking that the developer chose not to build (often due to land restrictions). The penalties for not providing the minimum required parking can amount to triple the amount it costs the developers to construct the parking (Shoup, Summer 1999). So, in most cases the developer chooses to provide the parking instead of paying the fees. If minimum parking requirements were lifted from zoning ordinances, this might encourage developers to provide a lesser amount of parking.

Deuker et al. pointed out that there are certain equity issues that would need addressed with the initial introduction of impact fees. The first developers assessed with such fees might be forced to unfairly absorb financial costs that previous developers did not; making their project more costly to the eventual occupiers of the development than one right next to it.

5.6 Changes in zoning ordinances to restrict parking supply including decreased minimum parking requirements.

Sometimes the municipality reduces the minimum number of parking spaces required per square foot of development, or initiates parking maximums, which limit the amount of parking a developer can supply, or the municipality grants conditional-use permits, which are permits for parking given only when conditions are met such as spaces set aside for park and ride usage or carpools (Deuker, 1998, 73). Deuker et al. found that

changes in zoning ordinances had a wide variance on its effectiveness for increasing transit ridership, dependent on local conditions.

5.7 Shared Parking

Allows two or more adjacent land uses to share the same parking supply. They often have different peak characteristics, the sharing occurs because the same location can be used at two different times, for two different purposes. Church parking lots usually stand empty most of the week, making them an outstanding candidate for sharing. The sharing of parking can also occur when an individual parks in one location and walks to two or more destinations. Childs suggests that shared parking should be calculated combining two separate guidelines: ITE's 1995 Shared Parking Guidelines and the Urban Land Institute's (ULI) Shared Parking (Childs, 1999). Over time local data and experience by the individual planner should replace national guideline figures.

5.8 Transportation Demand Management (TDM)

A variety of options such as using satellite parking shuttle lots, preferential parking for carpools, and transit-incentive programs. Large employers often implement TDM strategies. Satellite parking shuttle lots allow the parking supply to be removed from the destination – usually work (often due to shortages of available land) by running shuttle buses back and forth from the satellite lot to the destination area. Preferential parking for carpools might be employers permitting carpoolers to park closest to the office building or reducing the cost to park for carpoolers if a fee is involved. Or preferential parking could be having designated carpool parking closest to work or the

transit stop. Single occupant drivers would have to park further away, which they might think about on rainy or snowy days. Employers with transit-incentive programs often offer free or subsidized transit passes to their employees. This is often called a "parking allowance." Some large employers also offer peace of mind to employees that use transit by making vehicles available to them for emergencies in a program called Emergency Ride Home or Guaranteed Ride Home. Some transit agencies have enacted TDM strategies by offering discounts to riders utilizing multiple transit modes such as free transfers to the bus from rail or in some instances offer a discounted transit ticket when combined with paid parking at the station. These are not the only possible TDM strategies, but are the ones that were analyzed for the Deuker study.

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6. Current Characteristic and Policies of Parking

Table III on page 38 shows details of the characteristics and policies of the parking offered by each of the agencies to gain a better understanding of just how varied each commuter rail agency's parking can be. There are currently no standards of what parking should look like at a commuter rail station. Figure 10 shows a most unusual commuter rail station; the Appalachian Trail station on the Metro North is located 65 miles from Grand Central Station. In reality, this station is probably not used by commuters, but it does illustrate the variations of station amenities and parking accommodations that are currently provided.

Figure 10. Appalachian Trail Rail Station
Source: http://www.anschechesed.org/activities/Outings/images/westmtn7.jpg

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TABLE III

PARKING DETAILS

AGENCY	# OF STATIONS	WRITTEN POLICY	TYPE OF PARKING	HRS OF OPERATION OF PARKING	OVERNIGHT	HOW IS OVERNIGHT PARKING HANDLED	LONGTERM	HOW IS LONG-TERM PARKING HANDLED
ACE	10		Surface	Hrs of Train service	X	Own Risk		
CALTRAIN	34		Both	24/7	X	24 Hr Rules		
DART -TRE	10		Surface	Hrs of Train service		Posted but not enforced		Posted but not enforced
GO	50	X	Surface	24/7		Signed, tag &/or tow if it is a problem		
MBTA	127		Both	24/7	X	Only in garages	X	Only in garages
METRA	229		Both	5AM – after midnight	X	Small # spaces are signed	X	Small # spaces are signed
MetroLinks	53		Both	Vary, when owned and operated by cities. Trains are 5am – 10pm	X	Amtrak allows – not really for MetroLinks		
MTA – LIRR	124		Both	24/7	X	Varies with township	X	Some permit - lots segmented
MTA – MNR	120		Both	24/7	X	Permits & Meters	X	Permit
MTA –MARC	42		Both	Hrs of Train service		Posted no overnight, but not enforced	X	New Carrolton (Amtrak), BWI, and Penn Station
NCTD - Coaster	8		Surface	24/7	X	Signage states a 72-hour max.	X	By permit
NICTD	20		Surface	5am – 1am		Not permitted, patrons can use parking at south Bend Airport and link to NICTD		Not permitted, patrons can use parking at south Bend Airport and link to NICTD
NJT	161		Both	24/7	X	Permitted but need to have permits during day for many	X	Special permission
OnTrack	6		Both	11am – 7pm	X	In surface lots that are free	X	In surface lots that are free
SEPTA	124	X	Surface	5AM –1AM		Enforcement/Tow signs	X	Pre-arrange $1/day
SLE	9		Both					
SoundTransit	7	X	Both	Hours depend on facility	X	Limited to 24 hrs or less	X	Make exceptions
TRI-RAIL	18		Surface	24/7	X	Own Risk		
VRE	18		Both	Surface 24/7; Garage - Hrs of Train service but can open	X	Own risk	X	Call office & pre-arrange
WCE	8		Surface	5am – 9pm				
TOTALS	**1178**	**3**	**8 - SURFACE, 12 - BOTH**	**10 – Hrs. of Operation 8 – 24/7**	**13**		**11**	

7. How Are Commuter Rail Agencies Currently Meeting Parking Demand?

7.1 How Is Parking at Commuter Rail Stations Different?

This paper has been purposefully limited to looking only at commuter rail agencies, of which there are currently just 22 operating systems listed with APTA. Commuter rail stations have different characteristics than park and rides for bus, including their location. Park and rides for bus tend to be located on the edge of an urban area, while a commuter rail station is often located in the center of an urban area with stations at major destinations such as universities, government centers, hospitals, and CBDs. Land on the fringe of an urban area generally costs less and is more readily available. Availability of land and the cost of providing parking tend to be a serious problem for commuter rail agencies to solve. Other types of transportation seldom provide parking; for example there is no parking at subway (heavy rail) stops or at light rail stops, except when they stop at a multi-modal station hosting other travel modes such as Amtrak.

Long distance rail such as Amtrak usually does offer parking, but the needs of the parking patrons are quite different from commuter rail patrons. Much of the parking at an Amtrak station is intended for very short-term use (30 minutes or less) and therefore turns over many times in a day. Many of the remaining Amtrak patrons are either dropped off or they park in segregated areas designated for long-term parking use. This paper is studying only commuter patrons who generally will be parking in the morning and returning to their vehicles at the end of a workday. Their vehicles will sit idle in

parking spaces that are located close to the rail station - UNLESS commuter rail agencies choose to encourage a new way of life with parking strategies to reduce demand.

7.2 "Build More Parking!"

Almost all of the commuter rail agencies taking part in the survey reported that there is indeed, very high demand to drive to the station and park. Several agencies are suffering from a good news/bad news situation. Their ridership is increasing/ but they are over capacity on parking demand – sending some would-be rail riders back to their cars. Six of the agencies responded emphatically with comments such as, "Build more parking," "Build as much parking as you can," "Bursting at the seams – can't build fast enough," "Try not to build and have to comeback and build again," and "Whatever your models have predicted you will need, build twice as much." These comments certainly indicate the pressure that the agencies are feeling to supply patrons with more parking or loose their ridership.

Figure 11. Narberth Borough, PA Rail Station Area
Source: http://www.narberthborough.com/pixnarb/shopcirc.jpg

You might expect the agencies speaking would be the oldest, the ones that have been in operation for most of the past century. It is certainly true that many of the older commuter rail systems, located in the most densely-populated areas of the country, could

have become land locked long ago, with their stations surrounded by commercial and residential growth and no place to locate additional parking. Figure 11 shows such an older community served by commuter rail (Narberth, PA on the SEPTA line). However, just as New Starts commuter rail agencies may be forced to invoke "eminent domain" in order to obtain the necessary land for their brand new stations, older agencies through the years have done likewise in order to accommodate the changing demands. Not all of the six agencies speaking with such emphasis were the older commuter rail systems. One of the newer agencies had incorrectly estimated its parking demand and was already filled to capacity, just four short months after opening its station. This agency is already in the process of building a large addition onto the already existing parking.

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8. Strategies Currently Being Used

When the respondents were questioned concerning their parking strategies for demand management, six agencies responded that they use no strategies (these six agencies were not all the same agencies that felt that building more parking is the answer). Three of the agencies were fairly new and the other three were very old commuter rail systems. Table IV on page 48, lists all the parking strategies named by the respondents and follows at the end of this section. Below is a list of some of the parking strategies currently being used – these vary from the strategies identified earlier by Deuker et al. (see section entitled "Eight Parking Strategies"):

Some of the Strategies Currently Used By Commuter Rail Agencies
Shared Parking
Designated Space for Vanpools
Designated Space for Carpools
Designated Space for a Shared Car Program
Reconfiguring Spaces
Pricing – oversell permits
Multi-modal stations
Discounts on Transit
Free subscription shuttle service
Valet parking for off site parking location
Kiss 'n Rides

8.1 Designated Spaces for a Shared Car Program.

The idea behind a shared car program is that not everyone needs to own a car, especially in a city. It assumes that much of the time people can get around by public transportation, walking and biking. If people had access to a car when they really need it, they could pay for a car only when they actually need it. Zipcars is a shared car program that is currently operating in just a few cities in the U.S. It was recently introduced in

Chapel Hill, NC at the University of North Carolina. For a maximum of $80/day (includes the gas and insurance) people can have use of a newer car from a fleet of usually energy efficient vehicles.

Three agencies answered that they participate in providing at least one designated space at at least one station for a shared car program. This program is still struggling to get off the ground nationwide, but there is a lot of interest in participating in the future.

Figure 12. Th!nk Car (Shared car) at MTA Rail Station
Source: http://www.nypa.gov/ev/default.htm

The MTA of New York is a proud participant in an electric car program and works in conjunction with the New York Power Authority and Ford in making a fleet of 100 electric station cars available at seven select rail stations. The cars are smaller, effectually creating less spatial demand for parking. Figure 12 shows curious people checking out the Th!nk car at a MTA rail station.

The drivers get prime parking at the train stations, complimentary electric fuel re-charging at the stations to power their TH!NK city cars, monthly TransitCheks to reduce commuting costs, and monthly insurance reduction credits. This program, although extremely popular, is no longer taking applications of interested participants, but it is a start towards an environmentally friendly way to commute. If people give up their private automobiles, it would in affect decrease demand for parking.

8.2 Reconfiguring Spaces.

Some of the strategies named by the agencies and listed above do not fit the true definition of a parking strategy, which is a policy or program designed to reduce demand. Reconfiguring spaces can only change the number of cars that can be fit into a parking area with design changes. This does not effectually change the demand for parking. Reconfiguring spaces is a very effective way of making the most of an existing parking facility, and is frequently recommended by parking consultants as a solution for meeting demand. Reconfiguration is, however, not a program or policy.

8.3 Oversell permits.

Overselling permits is not a true parking strategy. It does not decrease demand for parking - unless people give up on parking and go back to driving their SOV, no longer requesting parking. Three commuter rail agencies listed this as a strategy, and even went so far as to suggest a percentage of oversell – 20 percent.

It is true that not all people use a parking space at the rail stations each and every workday. People become ill, go on vacation, change jobs, and occasionally ride with a co-worker or family member. It is true that permits can and should be oversold for a parking lot or garage; however, it does not effectively lessen true demand. It probably lessens the number of complaints about no available parking, shortens the waiting lists for parking permits, and lessens the constant repeated requests for a permit.

8.4 Multi-Modal Stations.

Eighteen of the systems have at least one multi-modal station, which are stations with multiple transportation modes all coming together at one location. A policy of building multi-modal stations can encourage a better-connected transportation system offering more modal choices at different locations. This improved transportation connectivity and modal choice can have a very positive impact, lessening the demand for parking at rail stations, as well as improving equity in travel choices.

Currently, multi-modal stations are often located at the end of the rail line and at destination stations. When asked what other modes come into their multi-modal stations, all respondents included a bus link to the rail. Most included pedestrian paths, but this answer may have been a misnomer – mistaking a pedestrian path for a paved sidewalk from the parking lot to the station platform. A pedestrian pathway should actually be a system of interconnected walkways that lead somewhere, such as residential or commercial areas. A few commuter rail stations had links to heavy rail, six to light rail, six to bike paths, three to trolleys, and two to ferries.

8.5 Discounts on Transit.

The discount on transit is a program designed to encourage arriving at the commuter rail station by an alternative mode of mass transportation instead of in a SOV. An example of this occurs at GO Transit. They offer discounts of $1.75 on local transit fares. A GO customer with a valid GO ticket can ride local transit to/from a GO station for just $.50. The respondent felt that offering transit discounts has saved them from having to build a parking structure. It also increases overall transit ridership.

8.6 Free Subscription Shuttle Service.

This parking strategy is being utilized by VRE in Alexandria, VA, due to over-flowing capacity at some of their parking facilities. This program enables the commuter rail agency to run shuttle buses throughout the surrounding service areas of overcrowded stations and go directly to the customer's location (usually home). They pick up their subscribing ridership and deliver them to the rail stations, therefore avoiding the customer's demand for a parking space. This is a very expensive service to operate, and the program is currently too new to judge its success. As discussed earlier, the actual construction and maintenance costs of providing parking are so great that this strategy should not be summarily dismissed.

8.6 Valet Parking.

Wow, the ultimate in customer service! MetroLinks in Los Angeles is providing valet parking service at a couple of its rail stations. The valets take the vehicles to an off-site parking facility. This program was so successful that it was reported to have doubled the parking capacity at these stations. Although this strategy does not decrease demand for parking, it does have a substantial impact on the need to supply all parking at the station – which fits the definition of a parking strategy. With riders no longer having to worry whether they can find a parking place, it has shown a very positive impact by increasing ridership.

8.8 Kiss ‘N Rides.

This program is so popular and a part of the way of life in Long Island that it has been showing up in the movies for more than fifty years. Cars are permitted to pull up to a designated area directly adjacent to the station platform entrance and drop off and pick up passengers. Many of the agencies have official (signed) and unofficial (no signed and designated area, but a space in the parking area that is used in this way) kiss ‘n rides. Many of the towns served by NJT have a very active Kiss ‘n Ride program that has come about due largely to the shortage of parking spaces and the years-long waiting list for a permit for parking. Proposed station designs should carefully include a kiss ‘n ride areas with safe approaches for vehicles and safe pedestrian ways leading from the kiss ‘n ride area to the station. Figure 13 shows how the Kiss ‘n Ride area can be both attractive and be a safe loading/unloading area as well.

Figure 13. Kiss ‘N Ride area.
Source: http://www.transport.wa.gov.au/metro/policies/midland/station03.jpg

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TABLE IV

CURRENT PARKING STRATEGIES BEING USED BY RESPONDENTS[2]

STRATEGY	# CURRENTLY USING	# NOT CURRENTLY USING	# CURRENTLY CONSIDERING
Shared Parking	13	6	2
Designated Space for Vanpools	2	17	0
Designated Space for Carpools	2	17	0
Designated Space for a Shared Car Program	3	16	2
Reconfiguring Spaces	1	18	0
Pricing – oversell permits	3	16	0
Multi-modal stations	18	0	0
Discounts on Transit	2	16	0
Free subscription shuttle service	1	0	0
Valet parking for off site parking location	1	0	0
Give Priority to Rehabilitating parking area on lesser used branches to attract new ridership to a particular station	1	0	0
Guaranteed ride program	1	0	0
More pedestrian and bike friendly	1	0	0
Lease extra parking from cities in downtown	1	0	0
First come/First Serve	1	0	0
Major customer service	1	0	0
Enforcement of parking violations ($15 if not parked in 1 space)	1	0	0
Working with developers to build TODs. Encourage off peak travel	1	0	0

[2] Could not find complete answers on Website for Syracuse OnTrack and NICTD.

9. Amenities for Alternative Travel Modes

9.1 Bicycles on Rail.

Figure 14. Bikes Onboard Caltrain.
Source: http://www.bikemap.com/transit/photos_files/caltrain2.html

Bicycling amenities such as bike lockers, racks, and showers can do much to promote bicycling as a viable transportation mode choice to connect with rail. It is equally important to provide the ability for bicyclists to bring their bikes with them on the trains. Figure 14 and Figure 15 show two ways bikes can be brought onboard and stored safely during the train trip. Many agencies have at least one railcar equipped to accommodate bicycles. They often have special areas that bikes can be secured safely for the trip.

Figure 15. Bikes Onboard SoundTransit Train.
Source: http://www.soundtransit.org/sounder/RiderInfo/SdrBicycles.htm

Almost all the agencies state policy limitations concerning traveling on trains with bicycles, such as groups of more than five bicyclists must make arrangements ahead to travel at the same time. NICTD in Northern Indiana is the only agency that does not permit bicycles on trains at all. One agency asks bicyclists to purchase a $5 permit and fill out an application prior to traveling with their bike. They have to sign a waiver

releasing the rail agency from any responsibility for property damage to their bike. Bikes are not allowed on trains at peak travel times and on certain holidays they are not permitted at all. Bikes are only allowed on trains between certain stations on another rail. On the other hand, the same agency has some designated trains that permit a larger than usual number of bikes. Another agency has bike cars that accommodate 32 bikes in one car.

9.2 Bike Lockers.

Eleven agencies currently have bike lockers at at least one of their stations. Bike lockers permit bicyclists to securely store and lockup their bikes for the day while proceeding on their commuter rail. Bike lockers protect bikes from the weather elements. Refer to Figure 4 and Figure 5 to view two types of bike lockers. They can usually be rented for a very nominal fee at many of the agencies and are free at others. At one agency the fee is $15/yr, while at another there is a non-refundable deposit of $25. MetroLinks conducts a quarterly inventory of bike parking to determine if additional bike lockers/racks are needed and to assure good operating order of all lockers.

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10. Many Additional Words of Wisdom from the Ones Who Came Before

10.1 Ownership, Governance, Maintenance and Operations, and Financing of Parking.

Commuter rail agencies have to deal with very complex arrangements of governance, ownership, maintenance and operations, and financing of their parking facilities. Commuter rails services generally cover several different municipalities and often multiple counties. In some cases they actually cross state borders, such as the MNR in New York and Connecticut. Each township, county, and state has their own set of ordinances overseeing parking requirements and regulations.

Inconsistencies in the respondents' parking policies can sometimes occur due to satisfying the different governances. For example some municipalities insist on attendants being on duty in the lots, while others may wish for the enforcement of municipal parking regulations by their own police (municipal revenue), while still others do not wish to become involved in either security or enforcement issues in the lots.

Table V (shown on Page 52) shows each respondent's answers as to whether their lots are free or fee-based, who has ownership of the parking facilities, and who maintains and runs the operations of the parking. Several of the respondents of the older commuter rail agencies stated that they felt that some of the inconsistencies occur because of the nature of their "inherited "systems. Over the years, rail systems previously governed in different ways with very different policies have now been merged into the current rail agencies. "We had to work with what we inherited," was the comment made by three of the respondents.

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TABLE V
FEE-BASED OR FREE PARKING?[3]

AGENCY	FEE	FREE	WHO OWNS PARKING?[4]	WHO MAINTAINS & RUNS OPERATIONS?
SEPTA	X		A	A
MTA – MNR	X		A/M/P	A/M/P
METRA	X		A/M/P/R	A/M/P
TRI-RAIL		X	S/M/P	A
ACE		X	A/M/O	A/M/O
CALTRAIN	X		A/M	A/M
DART -TRE		X	A	A
MBTA	X		A/M/P	A/M/P
MetroLinks	X		M/C	M/C
VRE		X	C/M	A
MTA –MARC	X		R	R
GO		X	A	A
MTA – LIRR	X		A/M/P	A/M/P
SLE	X		R	R
NJT	X		A/M/P	A/M/P
OnTrack	X		M/R/P	M/R/P
NICTD		X	A	A
NCTD - Coaster		X	A	A
SoundTransit		X	A/M	A
WCE	X		A	A
TOTALS	**12**	**8**		

A – Commuter Rail Agency/Authority
S – State or other Public Agency
M – Municipality
C – County
R – Host Railroad
O – Other
P – Private

[3] If any of the commuter rail agency's stations require a fee, (even if they only have one fee-based station) the answer is they do have fees.
[4] Source for ownership and maintenance and operations is from (Wilcock, 2001) EXCEPT for OnTrack, and SoundTransit.

11. Pricing.

Whether to charge or not to charge for parking is one of the most perplexing questions that New Starts agencies will have to decide. Pricing can be a very effective parking strategy. Theoretically, if the price of parking goes up, the demand for parking should come down - BUT it is a very thin tightrope to walk between discouraging driving to the station and discouraging possible riders from taking the train.

In one of the towns served by NJT (Summit, NJ) they had rejected the idea to build an additional parking garage and increased parking prices to $14/day – the highest of any town in the area (Non-Solutions for Rail Parking, 1997). They did not, however, propose any alternative to parking. They considered 16 different alternatives, but every one of them involved parking. Summit is an affluent community that could withstand the increase in price more easily than other towns. Almost 40% of the riders already had walked to the train station in the center of the town.

The Tri-State Transportation Campaign folks encouraged the municipal leaders to consider adding better connectivity as well as raising the price. One of the neighboring towns started a jitney service to the station and it attracted standing-room-only crowds. This is exactly the type of ridership difficulties that all New Starts hope to have.

11.1 Near Paid Parking?

Twelve of the respondents currently charge a fee for parking at at least one of their stations. Of the twelve charging fees, only eight were in close proximity to other paid parking. Proximity to other fee-based parking does not appear to be the conduit for creating the charge. Who owned and managed the parking seemed to be the more

decisive factor. Municipal lots, private lots, and lots owned by Amtrak were more likely to charge a fee than lots owned and operated by the commuter rail agency (see Table V on Page 52).

"Fees are looked at as revenue generators." Two of the respondents felt that fee-based parking meant revenue, and they were very pleased with how much money they had been able to generate through their parking fees. Many of the respondents had a great deal of advice to lend on the subject of pricing. Another respondent stated that the best way to collect monies for parking was to include it in the overall rail ticket price, therefore effectively hiding the fact that all patrons were subsidizing the parking facilities.

11.2 Consistency.

"Be Consistent Up and Down the Line." Some agencies have had the difficult task of justifying their "inherited" system of pricing (example: one station is free and the next station on the line charges $15/day). Many of the agencies recommended that (if at all possible) a consistent pricing policy should be set up from the start. They believe that either all stations or none should be free. There was also a recommendation to charge from the very beginning (even if it was a very nominal fee), so customers would not become outraged if the agency were forced to have to institute fee-based parking in the future. They stated that they had witnessed the ire of the public when their parking went from free to fee – and it was indeed an ugly sight to behold.

11.3 Written Parking Policy.

In line with the thinking of consistency, several of the respondents are currently working to establish a written parking policy, which will be part of the public domain – published on their websites to be easily referred to. Currently only three of the agencies have a written parking policy. The policy would include accurate information concerning pricing for parking at all stations as well as hours of operation. What type of vehicles can park, whether overnight and long-term parking are allowable, and what the penalties for infractions of the rules would be are all things that should be included in the written policy. Local jurisdictional interests can make writing a parking policy more difficult than it should be, according to one respondent. Politics is always close at hand, where public transportation is involved.

11.4 Ease of Understanding Fees.

Simplicity is the key to providing good customer service and happy patrons. Both fee-schedules and parking rules should be kept to a minimum, with as few exceptions as possible. For example, if you do not allow overnight parking – don't allow long-term parking. Several current agencies seem to do just that. It would be difficult working in the customer service office trying to explain this policy. Fees should be uncomplicated. For example, if parking costs $1/day, prices should not be discounted for 5 days/week to $4/week. Inconsistent policies confuse the patrons and confuse the people working in customer service, thereby increasing the possibility of giving misinformation to the

public; creating an angry, unhappy public. "In order to avoid confusion and for the best possible customer service, be consistent."

11.5 Method of Fee Collection and Enforcement.

Respondents to this study had several recommendations concerning how to best physically collect fees. Of the twelve agencies that currently collect fees: five use a permit system, three use meters, two use pay and display machines, and two use machines that dispense time cards. One uses a validation machine, one uses a coin box, and one uses a gate with time cards. The reason the answers add beyond the original twelve – is because of the inconsistencies again. Different stations have different methods of collecting fees. Figure 16 shows a Pay and Display machine.

One respondent stated that if an agency should decide to use coin boxes that they would need 1 coin box for each 100 spaces. They recommended that the agency spend the extra money and purchase an electronic meter that costs approximately $8,000 – $12,000. It runs a tape of all unpaid spaces and makes it very easy for the attendant/parking enforcement to take the tape and go to each of the unpaid spaces and check that no car is occupying the space.

Figure 16. Pay and Display Machine.
Source: http://www.blds.canterbury.ac.nz/Parking/pay02.jpg

Another respondent reported that they ticket cars ($15), if they are parked incorrectly and take up more than one space. This is an excellent way to cut down on parking

supply that is lost due to incorrect parking. Usually, when inventorying a parking facility a certain percentage of the parking is subtracted out to be lost due to this exact problem. Spaces are also made unusable due to spaces in disrepair or snow removal. It is important to remember that not all spaces are going to be useable on any given day.

Another respondent recommended that agencies should hard wire all parking lots at the time of construction, so that the cost of ripping up the lot and laying conduit at a later time would never be an issue. The conduit would be necessary if installing time cards and gates. They also suggested that the actual posts and base for the gate and time card dispenser also be installed at the initial construction. The cost of ripping up and repaving a lot is very high.

Another response indicated that by using a pay by space multi-meter, collection is easier than with other methods. They can be easily adjusted if a decision is made to raise the price. They recommended starting with a very nominal fee.

As a final bit of advice on collection methods: if you are using an unattended lot, use an honor box that is mechanical. It does not dispense receipts, which is good because then it cannot quit working, and bad because customers are unhappy that they cannot prove that they indeed did pay without a receipt. This type of collection method is hardier against vandals. The respondent recommended Sudden Specialties in Oklahoma. It is constructed of pickproof stainless steel. Electronic equipment breaks down more easily than mechanical equipment.

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12. Security

Fourteen of the commuter rail agencies provide some type of security at their rail stations. (See Table VI on Page 59) Six of the fourteen agencies employ multiple methods of security. Seven of them make use of surveillance cameras. Municipal police patrol eight of the agencies' stations. Six commuter rail agencies' stations have attendants (in a couple of instances the attendants are actually ticket sellers employed by Amtrak and keep the same hours as Amtrak). Private security patrols four of the agencies' stations.

Issues such as providing an environment that is perceived as safe, clean, and well lit play an integral part in customer service. If a rail station or the parking area is perceived to be unsafe, the ridership will reflect this in its decreased numbers.

Victoria Transport Policy Institute has an online TDM encyclopedia that includes a great number of best practices for security concerns. This site can be accessed at http://www.vtpi.org/tdm/tdm37.htm. It is an outstanding source for ideas on anything to do with transportation. Among the best practices, there is a suggestion to locate transit stops near shops to increase informal surveillance. It is also recommended that security should always be a part of a TDM strategy. Involve the community in crime prevention programs both in the planning and implementation stages. Maximizing visibility in public areas (that would include the station areas) is also recommended. Making sure visual obstructions are not present in the design, before they are built. Good lighting is a must for good security. Patrons become very nervous and unhappy in parking lots and station platforms when there is inadequate lighting. Unhappy patrons do not continue to be rail riders.

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TABLE VI

SECURITY MEASURES

AGENCY	CAMERAS	TOWN POLICE	PRIVATE PATROL	ATTENDANT
MNR			X	
METRA		X		
TRI-RAIL			X	
ACE	X			X
DART – TRE			X	
MBTA			X	
METROLINKS	X	X		
MTA – MARC		X		
GO	X			
MTA – LIRR	X	X		
NJT	X	X		
COASTER	X	X		X
SOUNDTRANSIT	X	X		X
WCE		X		
TOTAL	7	8	4	3

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13. Additional Amenities

Sometimes it is the little details that really add up to great customer satisfaction.

Figure 17. Proposed station design in Los Angeles.
Source: http://www.arroyoseco.org/images/avenue26_stationSML.gif

Figures 17 and 18 are both attractive stations although they differ considerably in appearance. Security precautions and the details that create a positive perception, along with other amenities can mean the difference between less than spectacular ridership numbers and a standing-room-only successful commuter rail agency. Clean, well maintained parking facilities with easy to locate trash cans and public phones contribute to a pleasing environment. Shelters from the weather and benches on which to sit and wait are also key components. There should be plenty of street furniture for all to use. Street furniture should be both attractive and. safe to use.

Figure 18. Proposed station design for SCRAA in Los Angeles
Source: http://www.acgenv.com/p-northrdige.htm

13.1 Alternative Uses for Parking Areas.

Mark Childs states in Parking Spaces, that parking facilities are not just places to put our car, but they are also a place in which we partake of social interactions (Childs, 1999). He states that "…separating buildings from one another with uninhabited spaces, they undermine the ability of cities to be social places." (Childs, 1999, p.xix). Frequently small groups of people can be seen recognizing one another and stopping to converse in a parking lot. Child's book, Parking Spaces, has an extraordinary number of highly creative ways in which to make better use of our parking facilities. He shows examples of uses such as "Shakespeare in the Parking Lot," "Art in the Park," and "Park of Beautiful Gardens" (a parking garden instead of a parking lot). Some of these alternative uses are becoming commonplace and can be seen all over the U.S. For example the large commuter lot that turns into a farmers market or a flea market on the weekend are good ways to have alternative uses for the parking facilities that we build. Very, very large parking areas used for outdoor concert arenas are being used in many cities to display a drive-through "Festival of Lights" display at Christmastime or host large flea markets.

13.2 Signage.

Clear, easy to understand signage, such as the signs shown in Figures 19 and 20, should be displayed that tells patrons what they need to know. Signs should tell where it is permissible to park, where to catch the appropriate train, any regulations that might be of interest to patrons such as whether

Figure 19. Bike Parking Sign
Source: http://members.aol.com/rmoeuradot/200x200/guide/D4-3.gif

long-term or overnight parking is permissible, and the hours in which it is permissible to park at the station. Easy to understand signage can contribute to the overall satisfaction of the commuter rail experience. Good, effective signage should not be underrated.

Figure 20. Park and Ride Sign
Source:
http://www.trimet.org/schedule/images/parkandride.gif

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14. Conclusions

Many U.S. cities are exploring the idea of building commuter rail systems to help alleviate road congestion. Planners are working diligently to design plans for the proposed rail stations. Decisions concerning parking at the stations are one of the challenges facing planners. Best practices specific to handling the demand for parking at rail stations has not been previously addressed. Planners are struggling with how to balance the need to provide easy access to commuter rail stations (to help encourage ridership) with the knowledge that land acquisition for parking is very costly and not necessarily the best use of the land. Most commuter rail riders expect to be able to drive their personal automobiles to the rail stations and have a safe, cheap or free, conveniently close space provided for their car at all times.

In general, minimum parking requirements and newer parking demand management strategies such as shared parking are currently being re-evaluated for encouraging more sustainable land use practices. Parking uses tens of thousands of acres of land in the U.S. Parking lots create both environmental and economic impacts. Land used for parking is not usually used for any other purpose than as a place to put our automobiles, while we are not driving them.

This study recommends incorporating as many strategies to reduce parking demand in the design of a station as possible from the moment of inception. These strategies include multi-modal station designs, shared parking programs, designated space for shared car programs or station rental cars, space for carpools and vanpools, pricing policies, kiss ‘n rides, valet parking for off-site parking locations, free subscription shuttle service, and discounts on transit. Planners should reconfigure

parking generation models to consider shared parking and other parking demand management strategies as variables. Not all of the Eight Parking strategies suggested by Deuker et al. may work well for parking at particular rail stations, but it will not hurt to examine these options when doing the initial station design. Residential parking permit programs may work positively to control spillover parking from the stations onto surrounding residential streets. Commuter rail agencies should work with municipalities to institute such parking permit programs well before the construction of the station. Instituting a residential parking benefit district in a timely manner will help to ensure that all the glitches have been solved prior to the opening of the station. A variety of transportation demand management strategies should be included in any rail station design.

Follow the advice from current commuter rail agencies contained within this study and offer alternative travel modes to arrive at the station. The key word to remember is access not parking. Riders really just want a reliable, safe, convenient and quick way to arrive at the station; they do not really need to have their own car – just the characteristics that make them favor this travel mode.

Don't be afraid to make the facility more appealing with art or plantings. Going to a commuter rail station does not have to make the patrons feel unhappy, wishing they didn't have to be there. Plan the design of the facilities very carefully. Remember the amenities such as street furniture and cleanliness help make an inviting environment for all.

Parking has a very large cost with very little benefit. Make the most of the land and the surrounding environment. Dare to be innovative. TABLE OF CONTENTS

APPENDIX A

SURVEY QUESTIONS FOR COMMUTER RAIL AGENCIES

We know that not every station is the same, so please answer so as to encompass the big picture as much as possible.

PLEASE FILL IN THE BLANKS OR CIRCLE ALL ANSWERS THAT APPLY:
(Please feel free to clarify with additional comments to any question)

GENERAL

How many commuter rail stations do you have? _____

Is parking generally available at your commuter rail stations? YES NO

What type of parking? SURFACE GARAGE BOTH

What are the hours of operation for parking? _____

Is overnight parking allowed? YES NO If so, how is it handled? _____

Do you offer long-term parking? YES NO If so, how is it handled? _____

Are there security measures used? YES NO

If so, what type of security (surveillance cameras, on-duty attendants, etc.)? _____

Do you participate in any shared parking arrangements? YES NO

Are bike lockers available? YES NO

Is there designated parking for carpools? YES NO

Is there designated parking for Vanpools? YES NO

Is there designated parking for Shared Car Parking? YES NO

FEES

Is parking FEE-BASED FREE?

Is the parking located near other paid parking? YES NO

How much does the parking cost, if a fee is involved? _____

Are the fees HOURLY DAILY MONTHLY ALL?

Are different fees associated with peak hour usage? YES NO

Do you use VALIDATION/ADD FARE MACHINES METERS MACHINES THAT DISPENSE TIME CARDS?

Is any of the parking gated and accessible only with a special card? YES NO

STATION

Is a multi-modal approach used for the rail station? YES NO

What travel modes are accommodated at the station? CAR BUS LIGHT RAIL

BIKE PATHS PEDESTRIAN PATHS

WRITTEN PARKING POLICY

Do you have a written parking policy? YES NO

If so, would you be willing to share a copy of the written policy with the TTA? YES NO

PARKING DEMAND MANAGEMENT STRATEGIES

What parking demand management strategies have you implemented? _____

_____

_____

_____

_____

ANY RECOMMENDATIONS OR FINAL COMMENTS:

_____

_____

APPENDIX B

DEFINITIONS

Cashing-out employer-provided parking - required employers, with more than 50 employees and who subsidize the cost of parking by providing free parking to employees, to offer employees the option of receiving the cash equivalent to the subsidy of the space instead of using their parking space

Commuter Rail – urban passenger train service that operates on existing freight railroad tracks. Travel between a central city and adjacent suburbs and long haul (regional) passenger service between cities. Operates during peak travel times. Trains run inbound to the city center and outbound to suburban areas. Average trip length is 22 miles and makes fewer stops - generally 5 miles apart. It costs $3-10 million a mile. (source MN Dept of Transportation)

Conditional-use permits - which are permits granted by a municipality or county for parking, given only when conditions are met such as spaces set aside for park and ride usage or carpools.

High-Speed Rail – family of technology of both steel-wheel on rail and magnetic levitation (maglev) systems. Is intercity rail service which operates primarily on a dedicated guideway or track not used, for the most part, by freight, including, but not limited to, trains on welded rail, magnetically levitated (MAGLEV) vehicles on a special guideway, or other advanced technology vehicles. Trains traveling at top speeds of 90 (steel-wheel) to 300 (maglev) mph. Time competitive with air or auto. Travels approximately 100 – 500 miles. It costs $3-80 million a mile (source MN Dept. of Transportation)

Light Rail Transit – electric rail cars that operate in short trains. Also known as "streetcar," "tramway," or "trolley car." Powered from an overhead wire and can run on exclusive or semi-exclusive or shared lines with or without grade crossings or even in traffic lanes on city streets. Usually travel 10 – 20 mile corridors with stops .5 – 1.5 miles apart. It costs $12-100 million a mile. (Source: MN Dept. of Transportation)

Multi-modal stations – a station accommodating various modes of surface transportation including bicycles, pedestrians, transit vehicles, ferries, trains and personal vehicles.

Park and Rides – lots used mostly by commuters to park their cars for the day and travel the rest of their journey by bus. Lots are frequently located on the fringe of the municipality or in a shared parking arrangement with a shopping mall or other large venue with a great deal of underutilized parking (remember the mall lots are built for the Christmas season).

Parking Generation Rates – the average peak parking demand observed for each land use in case studies.

Parking impact fees - a one-time fee is levied against the developers based on the amount of parking they are providing.

Parking Maximums – regulations that limit the amount of parking a developer can supply

Parking strategies – policies or programs that affect supply, demand or costs.

Shared parking - allows two or more adjacent land uses to share the same parking supply, usually operating on different peak periods. Example: a church and a delicatessen.

Spillover parking - parking that spills on to surface streets from parking lots and garages.

Station rental cars – quiet, clean-running, mostly electric cars (some are natural gas) being offered for rental. A new program that offers choice parking at select rail stations along with recharging facilities. Targeted are commuters who can use the station cars to go from the station to home and back. Eventually these cars will be offered at a low purchase price of $10,000.

Station parking – lots or garages located at or very close to a rail station for the use of its rail patrons.

Transportation Demand Management (TDM) - includes a variety of strategies to encourage more efficient travel behavior. Improvement of the overall existing transportation system efficiency by altering transportation system demand through management of pricing, services, employer incentives rather than making capital improvements (source Victoria Transport Policy Institute - VTPI) The VTPI offers an online encyclopedia of TDM strategies.

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